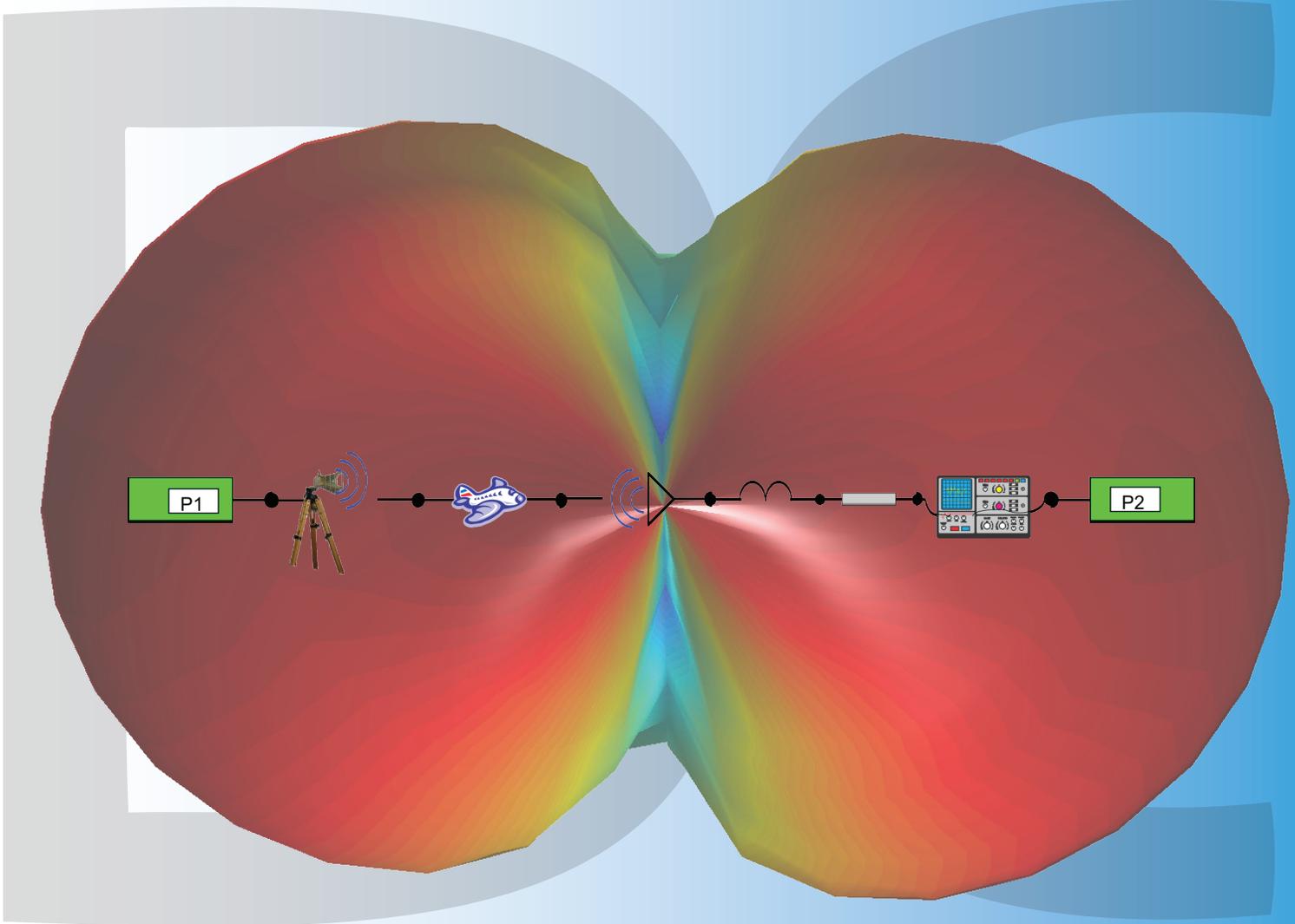# Diamond Engineering
Automated Measurement Systems

P1

P2

Antenna Network & Measurement Simulator

Simulator Features

The Antenna Network Measurement Simulator is the newest addition to Diamond Engineering's DAMS Antenna Measurement Studio. This optional module enables DAMS Antenna Measurement Studio to perform a whole host of new simulation capabilities. Designed to be fully customizable with editable icon-based schematics which utilize capture vectors (cascading two-port with wave addition). Also includes such features as circuit matching, radar cross-section, axis translation and rotation among others. Measurements can even be made directly from the schematic!
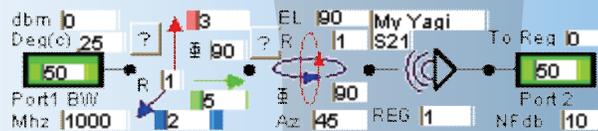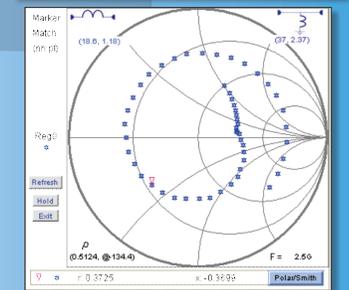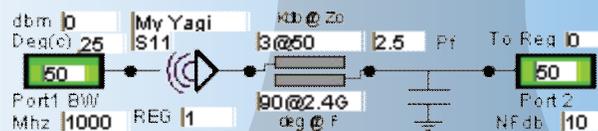
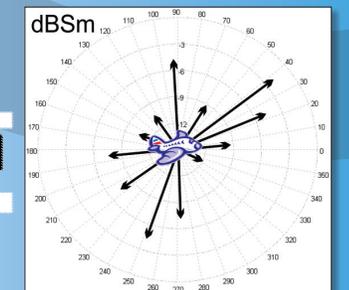◆ Simple drag and drop icon elements

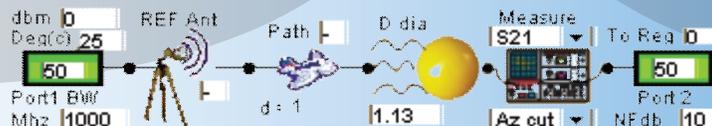◆ Analyze network path and phase
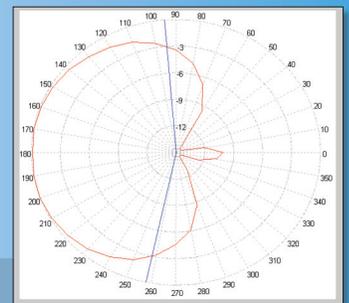
◆ Create phased arrays or sector arrays
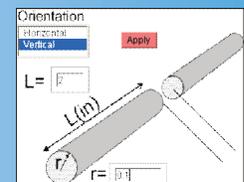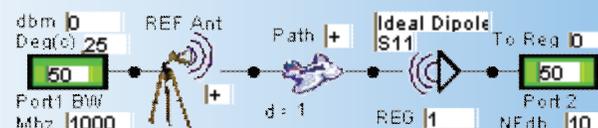
◆ Create matching circuits for measured antennas

◆ Measure AUTs from the schematic

◆ Radar cross-section measurements

◆ Includes an antenna emulation library containing ideal networks and other simulated ideal measurements

Simulator Overview

The simulator operates on any of the four two-port S-parameters generated from the element icon. Registers containing data then determine the size and shape of results.

Hides Calculator or Schematic   Initiates the simulator   Initiates the scientific array calculator

Data Manipulation Options   Generate Path Loss   Gain Xfer   Efficiency

Flip EL sign   Print   EL Swing Corr.   Import REF Antenna   3-Point Gain   Gain Substitution

Register Math   Calculator Status   Antenna NW Simulator   Scientific Calculator

HideCalc   HideSchem   ExitSim   SimHelp

Element Library: Drag Element to Sheet

dbm 0
Deg(c) 25   To Reg 0   My Yagi   S21

50   50

Port1 BW   Port 2
Mhz 1000   NFdb 10   REG 1
EL 90   D dia

?   ? R 1

R 1

Az 0   1.13

50 Ω   1 nh
1 Pf

90@5G   90@4G
Zo 45   Zo 50   Zo 50

90@2.4G   OST

Kdb @ Zo   L@er   L @ er
3@50   -5.5@2.01   .00254@4

90@2.4G   dia:o@dia:i   w / h @ t
deg @ F   .1@.03   1@ .001

Antenna Network Simulator

Schematic drag and drop pad

Measure
S21

Az cut

.S1P   Rotate   Calculate   Optimize   Save   Load   Plot   CLR/RCL

Exports results as S1P files

Saves schematic and all values to file

Changes a series element to a parallel element

Loads schematic files

Initiates analysis

Initiates the monitor plot and the array calculator

S11
S21
S12
S22
Power
Efficiency
TRP
Antenna Factor
RCS

Clears or recalls schematic. Double clicking loads last schmeatic after CLR. Single click at start up loads the last present schematic.

The example below demonstrates a basic measurement simulation. First, an actual 2.4GHz dipole was measured including the match. The **REF Ant** and **Path** icons utilize the **Import REF Ant** and **Generate Path Loss** data results previously stored in the register (REG1). As we can see, the dipole was not matched well at 2.4GHz and the required match is automatically suggested by the marker. (The measurement icon is also capable of taking measurements directly from the schematic as well!)

Example Schematic

Antenna Network Simulator
Measurement. Runs the measurement page AzEL Extents and test equipment

Reference Antenna icon   Path icon
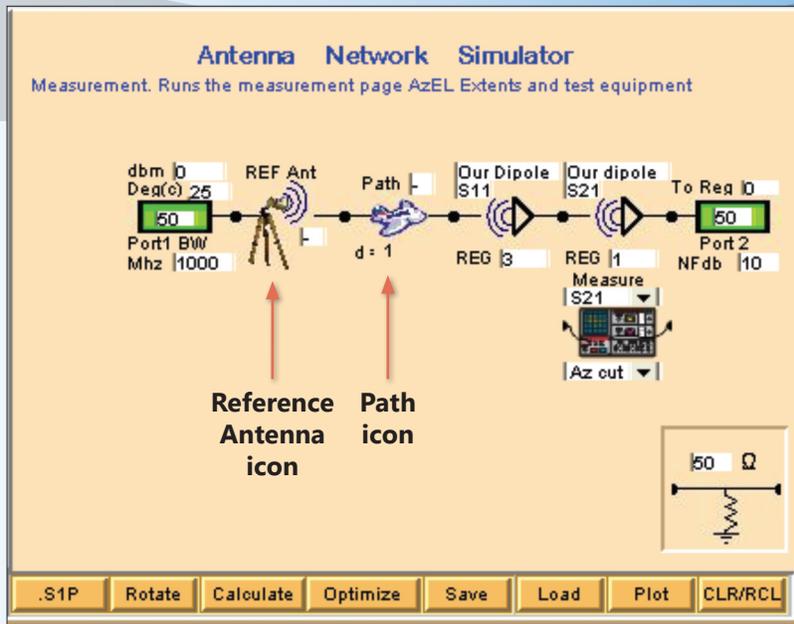
AUT gain   **Marker set to 2.4GHz indicates matching elements**

AUT match
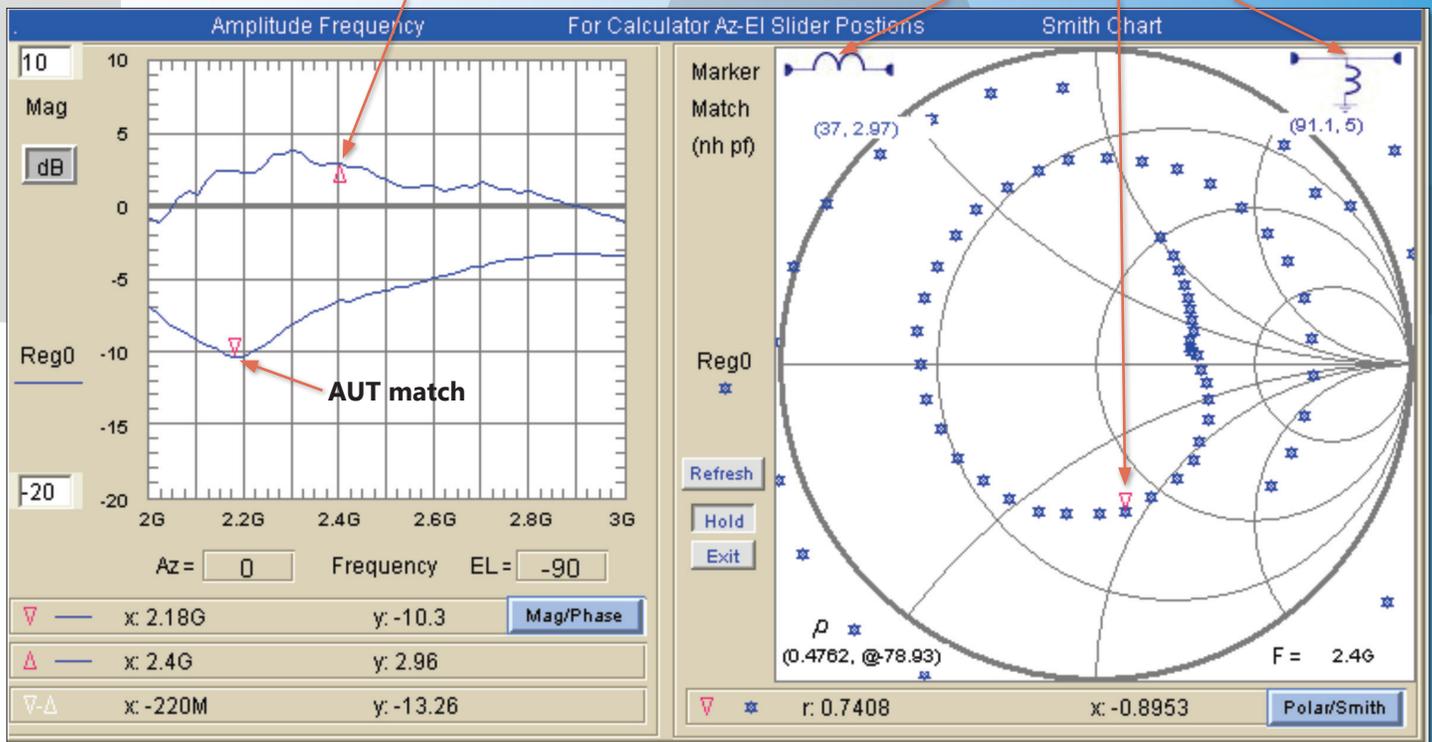
Example Simulation *(continued)*

After examining our initial simulated measurements, an inductor is added to the circuit which successfully improves match and gain, as shown below. This is one of many ways the DAMS Simulator Module is a valuable R&D solution that's guaranteed to save time and money.

Simulated inductor

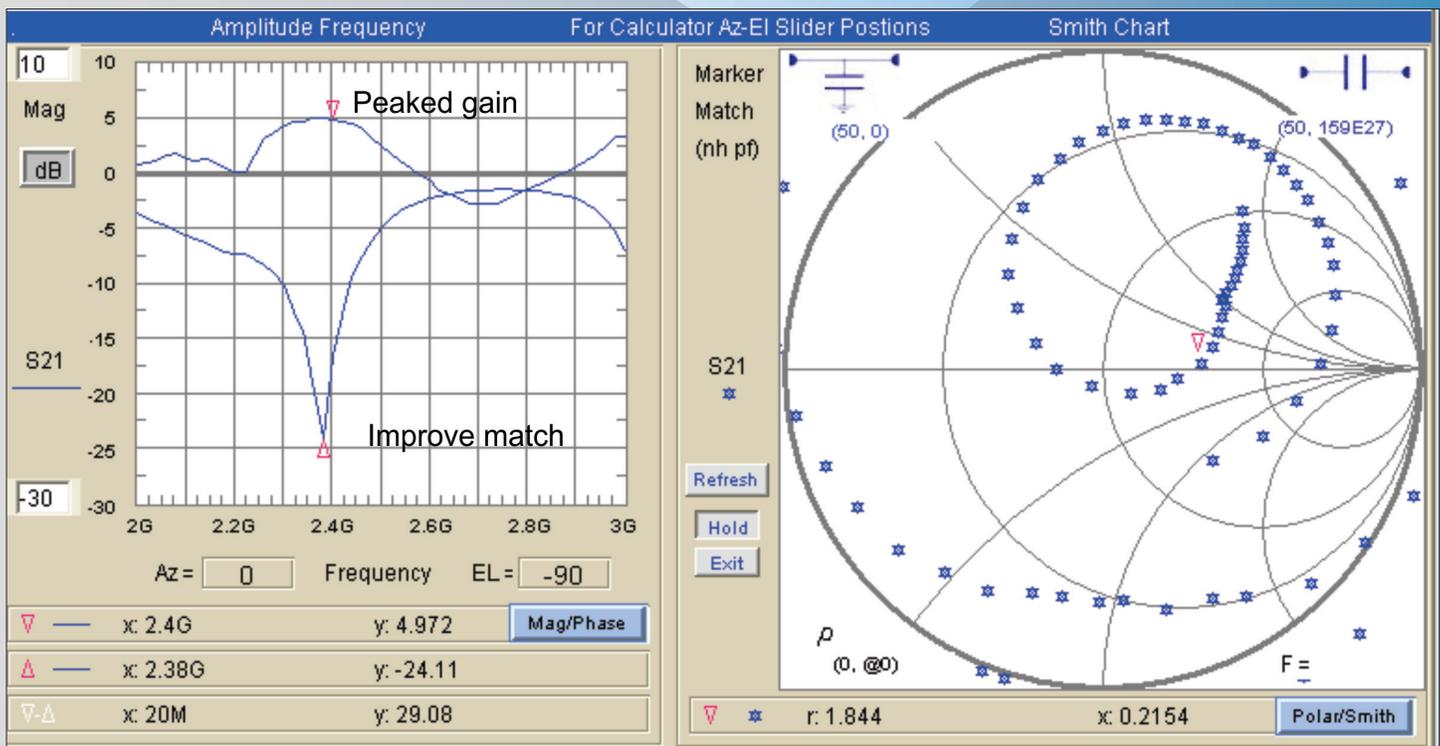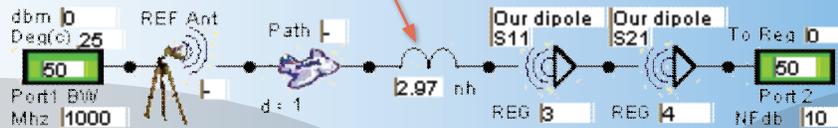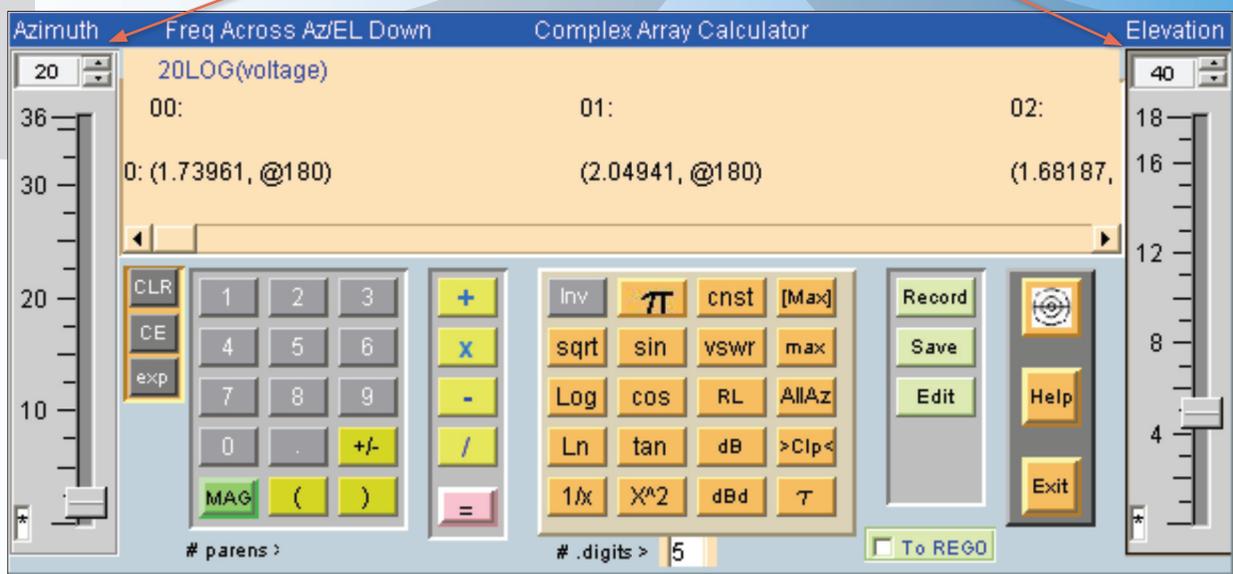|		
dbm 0	REF Ant	Our dipole Our dipole
Deg(c) 25	Path	S11 S21 To Reg 0
50		50
Port1 BW	d = 1	2.97 nh	Port 2
Mhz 1000		REG 3 REG 4 NFdb 10

Amplitude Frequency | For Calculator Az-El Slider Postions | Smith Chart

Peaked gain

Improve match

| | Az = 0 | Frequency | EL = -90 |

Marker
Match
(nh pf)
(50, 0)

S21

Refresh
Hold
Exit

(50, 159E27)

ρ
(0, @0)

F =

▽	—	x: 2.4G	y: 4.972	Mag/Phase
△	—	x: 2.38G	y: -24.11	
▽-△		x: 20M	y: 29.08	

| ▽ | ✳ | r: 1.844 | x: 0.2154 | Polar/Smith |

Sliders set AzEL contour for both the plot and the calculator

Azimuth | Freq Across Az/EL Down | Complex Array Calculator | Elevation

20

20LOG(voltage)

00:                           01:   02:

0: (1.73961, @180)   (2.04941, @180)   (1.68187,

40

CLR	1	2	3	+	Inv	π	cnst	[Max]	Record	
CE	4	5	6	X	sqrt	sin	vswr	max	Save	
exp	7	8	9	-	Log	cos	RL	AllAz	Edit	Help
	0	.	+/-	/	Ln	tan	dB	>Clp<		
	MAG	(	)	=	1/x	X^2	dBd	τ		Exit

parens >   # .digits > 5   ☐ To REG0

Diamond Engineering Product List

Standard x000 Series - *Up to 20 lb. capacity (9 kg.)*

Product Code	Frequency
D5000	DC-6 GHz
D6000	DC-18 GHz
D7000	DC-40 GHz

Heavy Duty x100 Series - *Up to 150 lb. capacity (90 kg.)*

Product Code	Frequency
D5100	DC-6 GHz
D6100	DC-18 GHz
D7100	DC-40 GHz

Heavy Duty x250 Series - *Up to 250 lb. capacity (113 kg.)*

Product Code	Frequency
D5250	DC-6 GHz
D6250	DC-18 GHz
D7250	DC-40 GHz

Full Spherical Mount - *Up to 10 lb. capacity (4.5 kg.)*

Product Code	Frequency
DFSM-5-18	DC-18 GHz
DFSM-5-40	DC-40 GHz
DFSM-10-18	DC-18 GHz
DFSM-10-40	DC-40 GHz

Download our fully functional demo software at **www.DiamondEng.net**

Visit us on your Smart Phone!

Optional Accessories

	Product Code
Advanced Processing Module (incl. with 6x00/7x00)	DPA-APM
Pre-Configured Desktop or Laptop PC w/ GPIB	DPA-PC-DSK *or* DPA-PC-LAP
NEW! Antenna Network and Measurement Simulator	DANMS

Contact Information

Company Headquarters

Diamond Engineering
P.O. Box 2037
484 Main Street, Suite 16
Diamond Springs, CA 95619

Telephone: 530-626-3857
Fax: 530-626-0495

http://www.DiamondEng.net
Sales@DiamondEng.net
Support@DiamondEng.net

Channel Partner

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